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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/770,931	02/03/2004	Paul Tinwell	FMO P-3855-1	1664

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JAMES D. STEVENS
REISING, ETHINGTON, BARNES, KISSELLE, P.C.
P.O. BOX 4390
TROY, MI 48099

EXAMINER	
HODGES, MATTHEW P	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 06/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/770,931	TINWELL, PAUL	
	Examiner	Art Unit	
	Matt P. Hodges	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) *1-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-43* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/23/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

As the previous election of species requirement is withdrawn, examiner has instead included in this action the related restriction requirement. Applicant indicated their response to the restriction requirement in the action filed 4/24/2006. This information is provided to clarify the record, however no additional response is required by the applicant with respect to the following restriction.

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-11, drawn to a spark plug with a dimensional relationship of its center electrode, its collar construction and metal tip, classified in class 313, subclass 118.

II. Claims 12-19, drawn to a spark plug with a dimensional relationship of the insulator towards the surrounding shell and ground electrode, classified in class 313, subclass 142.

III. Claims 20-29, drawn to a spark plug with a dimensional relationship of ground electrode and its related metal pad, classified in class 313, subclass 141.

IV. Claims 30-43, drawn to a spark plug dimensional relationship of center electrode, its tapered portions, and the surrounding bore, classified in class 313, subclass 136.

The inventions are distinct, each from the other because of the following reasons:

Inventions I-IV are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination IV has separate utility from subcombinations I-III for instance in that the relationship of the widths of the center electrode and it's related shell insulator are independent from the various measurements of the distance to the noble tip, specifics of the ground electrode, and structure of the outer electrode shell to the tip surface. See MPEP § 806.05(d).

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Applicant's election without traverse of group IV in the reply filed on 4/24/2006 is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 30, 31, 35-38, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,265,816) in view of Yamaguchi et al. (US 4,700,103).

Regarding claims 30 and 37, Ito discloses (see figure 1) a spark plug including a threaded shell (1) with an axial bore, an insulator (2) located partially inside the shell axial bore, a center electrode (3) located inside the insulator, and a ground electrode (4) connected to the shell. The center electrode includes a main shank portion located inside the insulator bore (D_6) and a first radially reduced portion located inside the insulator bore (D_7). The size of the two portions are determined by the insulating bore and are between 2-5mm and 1-3.5mm respectively. (Column 11 lines 25-31). Further the diameter of the shell threading is either 12 or 14mm. (Column 12 lines 5-10). Ito further discloses (see figure 3) a radially reduced portion on which a noble metal tip is attached. Ito does not appear to specify the use of a recess portion to attach the noble metal tip to the center electrode, however Yamaguchi, in the same field of endeavor, discloses (see figures 5a-5b) the use of a recess formed in the center electrode in order to mechanically attach a metal tip partially inside the center electrode. The use of a recessed tip advantageously reduces thermal stress and improves durability. (Column 2 lines 35-40). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate the use of a recess portion to attach the noble metal tip to the center electrode as taught by Yamaguchi into the device as disclosed by Ito in order to advantageously reduce thermal stress and improve durability.

Regarding claims 31 and 38, Ito further discloses the use of an Ir alloy noble metal tip. (Column 9 lines 5-11).

Regarding claims 35 and 42, Ito further discloses the use of a flat noble metal pad opposite the noble metal tip and formed on the ground electrode to form a sparking surface. (See figure 3 and Column 12 lines 15-20).

Regarding claims 36 and 43, Ito in view of Yamaguchi discloses the device as claimed (see rejections of claims 30 and 37 above) but does not appear to specify the gap spacing between the noble tip and noble pad. However it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In this instance, the gap spacing of a spark plug is determined primarily by the general shape of the firing tip and ground electrode along with the voltage of the operating device. The shape of the tip and pad are defined and disclosed as claimed, while the voltage of the driving device is determined by the intended use of the device. Thus for these known variables, the optimum gap distance is a result effective variable that is bounded by an upper range where a spark cannot readily be maintained and a lower range where a spark may be inadvertent. Identifying the ideal values inside this range would only require routine experimentation by one having ordinary skill in the art. Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to select a gap spacing of between 0.5mm and 1.75mm, since discovering an optimum value of a result variable is considered within the skills of the art.

Claims 32-34 and 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,265,816) in view of Yamaguchi et al. (US 4,700,103) and further in view of Osamura et al. (US 6,262,522).

Regarding claims 32 and 39, Ito in view of Yamaguchi discloses the device as claimed (see rejections of claim 31 and 38 above) but does not appear to specify the use of between 1 and 20% Rh in the Iridium tip. However Osamura, in the same field of endeavor, discloses (see figure 2) the use of a Ir-Rh metal tip where Rh is included in an amount of 3%. (See Table 1).

The use of Rh in the prescribed amount advantageously improves heat resistance and consumption resistance at high temperatures and thus improves device reliability and lifespan. (Column 1 lines 57-67). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate the use of between 1 and 20% Rh in the Iridium tip as taught by Osamura into the device as disclosed by Ito in view of Yamaguchi in order to advantageously improve device reliability and lifespan.

Regarding claims 33, 34, 40 and 41, Ito in view of Yamaguchi discloses the device as claimed (see rejections of claim 30 and 37 above) but does not appear to specify the dimensions of the noble metal tip. However Osamura, in the same field of endeavor, discloses (see figure 2) the use of a noble metal tip with a diameter between 0.5mm and 2.0mm and a length between 0.3mm and 2.5mm. (Column 2 lines 49-51). The use the prescribed dimensions advantageously improves consumption resistance, ignitability, welding stability, and durability. (Column 4 lines 7-25). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate the use of a noble metal tip with a diameter between 0.5mm and 2.0mm and a length between 0.3mm and 2.5mm as taught by Osamura into the device as disclosed by Ito in view of Yamaguchi in order to advantageously improve consumption resistance, ignitability, welding stability, and durability.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Matsubara et al. (US 5,873,338) discloses the use of an M14 spark plug with the claimed ranges bores, center electrode and gap spacing.

Kato et al. (US 5,877,584) discloses the use of a center electrode with a shoulder portion and attached noble metal tip.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matt P Hodges whose telephone number is (571) 272-2454. The examiner can normally be reached on 7:30 AM to 4:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mph

NIMESHKUMAR D. PATEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800